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An optimality theoretic study of local assimilation: data from Sorani Kurdish

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ABSTRACT

This study deals with the process of local assimilation of consonants in Kurdish. It is conducted within the theoretical framework of Optimality Theory(OT). The study hypothesizes that among the constraints of local assimilation , markedness is more dominant than faithfulness. It is also claimed that local assimilation can be found within a word and not necessarily between word boundaries. The paper is divided into three main sections; the first section addresses the main concepts and trends concerned with optimality theory. The second section deals with assimilation, its main concepts and categories. The third section shows the cases of local assimilation of consonants in Kurdish within the framework of OT. The sample of the study are all taken from (Sorani Kurdish- the semi standard dialect in Kurdish Language) from written and oral sources.

Introduction

In this paper, local assimilation of consonants in Kurdish is treated within the framework of Optimality Theory. The process of assimilation can be generally partitioned into two major types, local and long-distance. The cases of *local assimilation* take place rigorously between adjacent segments, such as between consonant segments within a consonant cluster (Bakovic, 2007:335). Crystal (2008:40) calls this type of assimilation contiguous or contact assimilation. And calls the other type non-contiguous or distance Assimilation. Lass (1984:171) gives an example of long distance assimilation in which the sound /n/ changes into /m/

open /↔Yπ↔ν/ → open /↔Yπ↔μ/

The general idea of Optimality Theory is that surface representations of language reflect resolutions of conflicts between competing constraints. According to the theory, a surface representation is optimal in the respect that it incurs least vital violations of a set of violable constraints that their ranking is language specific. Constraints are universal, they directly encode 'markedness principles' in order to preserve contrast. Ranking of constraints makes languages differ from one another by giving priorities to some constraints over others. This way of ranking is called "strict domination" which means if one constraint outranks another constraint; the higher ranked constraint has priority, without taking into account violations of lower ranked constraints. Such a violation must be minimal, which predicts the Economy feature of grammatical process. (Kager,1999:xi).

The following model is used for explaining the constraints inferred in the process of local assimilation of Kurdish consonants.

(Tableau 1, the model used for explaining assimilation)

/+x -x/ → /+x +x/	AGREE(x)	INDENT(x)
/+x +x/ ~ /+x -x/	Optimal (winner)	!* (loser)

Each row of the tableau is a comparison between the optimal candidate and the sub-optimal one which is known as the loser. These are arranged in this order (winner-loser). Each cell in the tableau from the column of the constraints indicates whether that constraints prefers the winner 'the optimal candidate' or the loser or sometimes neither member of the pair. Then, all Kurdish consonants: stops, fricatives, nasals, laterals and approximants will be tested according to the adopted model respectively for identifying the dominating constraints governing the process of local assimilation in Kurdish.

Basic Architecture of Optimality Theory:

The goal of optimality theory, like any other theory of linguistics, is to shed light on the process of speech production. The theories try to investigate and account for these processes from the speech sound inputs in the brain until the production of speech.

Optimality theory was first introduced by Alan Prince and Paul Smolensky in 1991 in a course delivered at the University of California, Santa Cruz. Late in 1993 they published it as an article entitled "Optimality Theory, constraint interaction in Generative Grammar" in New Brunswick. (McCarthy, 2002:1). The core principle of Optimality Theory lies in the interaction of constraints. The constraints are universal that are found among all the languages of the world, and the difference of their ranking makes languages to be different from each other. Constraints are also violated by candidates at different levels.

Candidate Comparison

Most of the linguistic theories can be best characterized as operational, rule based, or transformational: they take an input and apply some processes that convert it into an output. But the main action in optimality theory is comparative: the actual output is the optimal member of a set of candidate output forms. Interesting theoretical and analytic results in optimality theory come from understanding the details of how candidates are compared. In optimality theory candidates are compared by applying a hierarchy of violable constraints. The function of constraints is to evaluate the form of a candidate and its relationship to the input. In what concerns performance, candidates vary on different constraints. In case if we have two candidates the more optimal is the one which acts better on

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highest ranking constraint which makes a distinction between the two candidates. (McCarthy, 2002:3)

The output characteristically contravenes at least some of the lower-ranking candidates, because constraints are violable. In the simplest situation, two candidates are under evaluation by a single constraint "C". The optimal candidate is the one that incurs less violation of C. When there is more than one constraint, the ranking is strictly respected in comparing candidates; there is no universal assessment of candidates based on their performance on the whole constraint gestalt. In fact, the optimal candidate may actually perform worse than its competitor on some constraints ranked below the decisive one. So if constraint C1 is ranked above C2 and C3 (that is C1 dominates C2 and C3) then the output may perform worse than its competitor on both C2 and C3 as long as it performs better on C1. (Ibid)

In optimality theory, ranking of constraints can be shown by a Tableau, this lists two (or any number of) output candidates vertically in random order, and constraints horizontally, in a descending ranking from left to right. The cells contain violation marks '*' incurred by each candidate for the constraint heading the column.

A tableau for showing a simple domination

Tableau: 2(Tableau used in optimality theory)

	C1	C2
a. ☞candidate a		*
b. candidate b	*!	

The optimal candidate is marked by the index☞. This candidate (1 a), which has no violation of the higher- ranked constraint C1, a constraint violated by its competitor (1 b) note that the optimal candidate (1a) is actually not immaculate itself: it has a violation of C2, but this flaw is inconsequential to the outcome. Although the pattern of violations for C2 is the overturn of that for C1, this does not help candidate b. Its violation of C1 is already fatal, indicated by the accompanying exclamation mark '!' and the shading of cells whose violation content is no longer relevant. To sum up, candidate (a) is optimal as no candidate is available that fares better, satisfying constraints at the same time. A violation of C2 is taken for granted, as long as C1 can be satisfied. (Kager,1999:13)

Candidate comparison is the same when there are multiple violations, and it is not necessary to count violation-marks, since better or worse performance is all that is taken into account. Moreover, Tesar and Smolensky (2000:119) introduce the method of 'mark cancellation'. If and only if a tableau compares exactly two candidates, violation-marks that the two candidates share can be ignored or canceled, since those violation-marks contribute nothing to that particular comparison. Mark cancellation is also useful when candidates incur multiple violations: if one candidate has three violation-marks from some constraint and another candidate has five, mark cancellation reduces this to zero and two, respectively. Comparison, rather than counting, is what matters.

Tableau: 3 (more than one violation for one candidate)

	C1	C2
a. ☞candidate a		**
b. candidate b	*!	

Markedness:

Crystal (2008: 295) defines markedness as "an analytic principle in linguistics whereby pairs of linguistic features, seen as oppositions, are given different values of positive (marked) and neutral or negative (unmarked). In its most general sense, this distinction refers to the presence versus the absence of a particular linguistic feature." This indicates that if a certain feature was found in a linguistics item, it said to be marked and if it was not found then said to be unmarked. Furthermore, Crystal adds more to the definition and talks about the use of the term in later theories of phonology stating that "In later phonological theory, the notion of markedness took on a critical status. Based on the view that the unmarked value of a feature is the normal, neutral state of the relevant articulator, some approaches assert that only one value need be present in the underlying representation; the other can be predicted by a context-free rule which mirrors the relevant markedness statement." This can be exemplified in the vowel sound /□/ there must be the feature of lip rounding, so the unmarked case is that when it is {+ lip rounding}, in the cases when the sound loses the feature of lip rounding, as it happened in American English, then the sound is said to be marked {- lip rounding}.

In optimality theory, the notion is dealt with in this way, as Kager (1999, 2) states that the idea of faithfulness is that all types of linguistic structures have two values, one of which is 'marked', the other 'unmarked'. Unmarked values are cross-linguistically favored and fundamental in all grammars, while marked values are cross-linguistically avoided and used by grammars only to form contrast. For instance, all languages have unrounded front vowels such as [i] and [e], but only a subset of languages contrast these vowels with rounded front vowels such as [y]. Hence, the unmarked value of the distinctive feature [round] is [−round] in front vowels.

Faithfulness

Crystal (2008, 185) defines the term within Optimality theory as "In optimality theory, the degree to which one form (typically the output) preserves the properties of another form (typically the input). Faithfulness constraints penalize differences between the input and output representations. A set of abbreviatory conventions indicate the type of constraint, such as FaithC (faithfulness of consonants between output and input) and FaithV (faithfulness of vowels)". The degree to which an output form is identical to its input form is considered to be *faithfulness* in optimality theory.

Faithfulness constraints necessitate identity between the input and the output candidate under evaluation, using the evidence of input/output inequality supplied by GEN. Markedness constraints evaluate the form of the output candidate, favoring certain structural configurations (e.g., syllables with onsets) over others (e.g., syllables without onsets). (McCarthy, 2002:13)

Constraints of both types, faithfulness and markedness, are certainly essential. Without faithfulness constraints, all distinctions made by input forms would be reduced to some least-marked output. And without markedness constraints, there would be no way to account for languages differing systematically in the structures they permit. Interaction between faithfulness and markedness constraints is a key element of any OT analysis. (Ibid)

Archangeli (1999:535) considers faithfulness as a general property of phonological systems which is that the input, or mental illustration, and the output, or surface illustration, are in principal identical. For instance an input like /fals/ ("false"), we suppose an output that is similar, i.e. [falts], rather than something bearing little resemblance to the input(such as [kΘt] or [tru:]). The resemblances are expressed in Optimality theory via a family of faithfulness constraints, constraints that necessitate correspondence between the input and the output. In principle this might be seen as a symmetric relation (input and output are identical), there is significant confirmation supporting asymmetric correspondence relations. The example of /fals/ ↔ [falts] is helps to explain the matter. Every input sound has an

output correspondent (f,a,l,s), but there is an output sound (t) that does not have an input correspondent. Examples illustrating the opposite asymmetry exist as well. These involve input sounds with no output correspondent, illustrated by the vowel alternation in the two pronunciations of "separate," [sEp↔r↔t/ sEpr↔t].

Faithfulness constraints characterize these correspondences. The class of faithfulness constraints that maintains that properties of the input correspond to properties of the output are called MAX (maximize the input) constraints. Those demanding that the output correspond to the input are dubbed DEP (output depends on input) constraints. The MAX and DEP constraint families are relativized to every type of phonological structure-features, segments, and prosody. Ibid

McCarthy (2008, 13) makes a distinction between the two concepts stating that within optimality theory, markedness constraints are applied on the form of the outputs to distinguish them from constraints of a very different sort, faithfulness constraints. Faithfulness constraints ban differences between input and output. He also considers faithfulness constraints as one of Prince and Smolensky's cleverest ideas. There is not any theory of language to possess something like faithfulness constraints of optimality theory. Faithfulness constraints are only meaningful within the framework of optimality theory which lets violation of constraints. So faithfulness constraints have to be violable if they are going to be at all useful.

Assimilation terminologies :

This part deals with the most basic terminologies and concepts related to assimilation. The terminologies are treated on four different levels as follows:

Local Assimilation versus long-distance assimilation:

Bakovic (2007:335) assumes that the process of assimilation can be generally partitioned into two major types, local and long-distance. The cases of *local assimilation* take place rigorously between adjacent segments, such as between consonant segments within a consonant cluster. On the other hand *long-distance assimilations* occur between segments, whether consonants or vowels which are not adjacent such as consonants across a vowel.

Crystal (2008:40) illustrates that Several classifications of assimilation can be found. One of the classifications is due to whether the segment shifting is the consequence of the effect of a neighbouring sound or of one not adjacent. The first type which is local assimilation is the common one. Crystal calls it contiguous or contact assimilation. And calls the other type non-contiguous or distance Assimilation. Lass (1984:171) gives an example of local assimilation in which the sound /n/ changes into /m/

open /↔Yπ↔ν/ → open /↔Yπ↔μ/

Here, the sound /n/ is changed into the /m/ because of the influence of the sound /p/.

Crystal (2008:40) gives an example for *long distance assimilation* in which again the sound /n/ changes into /m/:

turn up trumps /τE:ρν̲ ℘ π τρ ℘ μπσ/ →

/τE:ρμ̲ ℘ π τρ ℘ μπσ/

The sound /n/ in *turn* has been changed into /m/ as a result of an influence of /p/ in *up*.

He further argues that *long distance assimilation* occurs in languages having *vowel harmony*, in which a vowel in one part of a word may influence other vowels to be articulated similarly, despite the fact that there are other sounds separating the assimilated vowels. Archangeli and Pulleyblank (2007:353) state that a system of harmony in general requires two or more not-necessarily adjacent segments have to be alike in some way. They give no example of English, but they give examples from different languages, one of these languages is Turkish, since Turkish is a well-known representative of languages with vowel harmony system. Every dark vowel must be followed by dark vowels; every light vowel must be followed by a light vowel. Dark vowels include: /α, ο, υ, I / and light vowels include:/e, ö, ü, i/.

Kiz → kizin 'girl'
Pul → pulun 'stamp'

It can be noted that the suffix for the first one begins with /i/ while for the second one it starts with /u/, this is due to the words that the former contains the sound /i/ that is why the suffix beings with /i/ and the same thing can be applied to the second example.

Regressive versus progressive assimilation

This is another form of categorizing assimilation according to the direction of the assimilation. Carr (2008:16) states that in regressive assimilation the first of two sounds undergoes assimilation to a coming sound. He also considers this type as the commonest type of assimilation. According to Trask (1996: 26) regressive assimilation is a phenomenon in which a phonetic attribute extends to a preceding segment, which he also calls anticipatory co-articulation. Crystal (2008: 27) believes that anticipatory assimilation is a "A term used in phonetics and phonology as part of the classification of types of assimilation. In anticipatory (or 'regressive') assimilation, a sound changes because of the influence of the following sound. It is opposed to progressive and coalescent assimilations." It can be summed up that anticipatory assimilation is a part of assimilation taxonomy in which a sound segment changes as a result fo the influence of a following sound. This kind of assimilation is dissimilar to progressive assimilation.

As Lass (1984:171) states that the normal classification of assimilation includes direction; the effect of assimilation may work on both directions, whether to the right or the left.

Crystal (2008: 40) argues that there are three possibilities in what concerns the direction of assimilation. To him, the first one is regressive or anticipatory as explained above, the second type is progressive assimilation in which a sound changes as a result of the effect of the preceding sound. The occurrence of this type of assimilation in English is very few and it is not common. The third type is coalescent or 'reciprocal' assimilation in which there is a shared effect or mixture of the sounds on one another. For example:

- Ten bikes /τεν̲ βαΙκσ/ → /τεμ̲ βαΙκσ/

/n/ ⟶ /m/

The direction of assimilation here is from left to right (regressive or anticipatory assimilation) in which the sound /n/ in *ten* has been assimilated to the sound /m/ as a result of the influence of the /b/ in the word *bike*.

- Lunch score /λ ℘ ντΣ σκ□:/ → / λ ℘ ντΣ Σκ□:/

/s/ ⟵ /Σ/

In this example the direction of assimilation is from right to left (progressive assimilation) in which the sound /s/ in *score* has been assimilated to the sound /Σ/ as a result of the influence of the sound /τΣ/ in the word *lunch*.

- don't you /○↔Yντ φY/ → /○↔YντΣY/

In this example the two sounds /t/ in *don't* and /j/ in *you* are mixed and changed into the affricate /τΣ/. This is an example of coalescent or 'reciprocal' assimilation.

Assimilation types according to feature

Another taxonomy of assimilation is related to the influence of the sound features on the process of assimilation. Lass (1984:173) states that the process of assimilation greatly influences almost all the sound segments. The above classifications of assimilation can be according to two major parameters, *place* and voice. In place assimilation the assimilating segment spreads the feature of place onto the assimilated sound. If the assimilating segment is bi-labial, as a result of the assimilation process the assimilated sound will copy the place feature bi-labial from the assimilating segment as:

- Ten bikes /τεν̲ βαΙκσ/ → /τεμ̲ βαΙκσ/

Here the sound /n/ in *ten* is an alveolar sound, while the sound /b/ in *bike* is bi-labial, that is why the sound /n/ has been assimilated to a bi-labial sound which is /m/.

The other type is voice assimilation, Carr (2008: 16) explains that voice assimilation is a common kind of the process in which the assimilated segment takes voice feature from the assimilating sound. Katamba (1989:81) explains that the plural marker 's' in English is a fine example of *voice assimilation*; for instance:

-pet /πετ / → pets /ρετσ /

The word ends in a voiceless sound which is /t/ that is why the pronunciation is the voiceless form of the segments which is /s/.

- bed /βεδ / → bells /βεδζ /

The word ends with the sound /d/ which is a voiced sound, that is why the suffix 's' will be made voiced and pronounced as /z/.

	Labial	Labio-dental	Alveo-dental	alveolar	Alveo-palatal	Velar	Post-alveolar	uvular	pharyngeal	Glottal
Stops	p b		t d			k g		q		
Affricate					ç ĵ					
Fricatives		f v	s z		ş ẓ		x ẋ		ḥ ?	h
Nasal	M		n							
Laterals			l	Ĺ						
Approximant	W			r ř	J					

Total versus partial assimilation:

The last point about the classification of assimilation will be about whether the assimilated sounds are totally assimilated or partially. Crystal exemplifies the case by stating that in an instance like:

- ten bikes /τεν̲ βαΙκσ/ → /τεμ̲ βαΙκσ/

the sound /n/ is assimilated to the sound /b/ only in the voice feature not in both features of place and voice, that is why the assimilation is partial not total. But in the example:

- ten mice /τεν μαΙσ/ → /τεμ μαΙσ/

the sound /n/ in the word *ten* is changed to the sound /m/. Here the assimilated sound is totally similar to the assimilating sound that is why the assimilation is total.

The consonants of Central Kirmanji dialect, what is known as Sorani, will be studied in this chapter. This dialect is the official language of Kurdistan Regional Government In Iraq. It is the language of media and journalism in the area.

There is a controversy among Kurdish scholars over the number of consonants in Central Kirmanji dialect of Kurdish. To avoid this controversy, the model adapted by Fattah 1997 will be used here. Twenty eight consonants can be identified on the basis of their function within a syllable that can occur in the positions of onset and coda. (Fattah, 1997:18)

Local Assimilation of Kurdish Consonants

Local Assimilation of Stops:

Kurdish has seven stop sounds, which are:

/p/ is a voiceless bilabial stop, it can occur initially, medially and finally: pãr /πα⏌ρ/ 'last year', čapĺa /τσ℘πλ℘/ 'applause' , qãp /θΘπ/ 'plate'

/b/is a voiced bilabial stop, it can be found in all positions of a word: bãrd /βΘρδ/ 'stone', rêbãz /ρΕβΘζ/ 'method', tareeb /τ℘ρΙ⏌β/ 'parallel'

/t/ is a voiceless dental stop, it can be found initially, medially and finally: trê /τρΕ/ 'grape', sarkawtin /σ℘ρκαυτ↔ν/, hãt /ηΘτ/ 'came'.

/d/ is a voiced dental stop, it can occur initially, medially and finally: dam /d℘m/ 'mouth, deedar /δΙ⏌δΘρ/ 'interview', merd /μΕρδ/ 'husband'

/k/ is a voiceless velar stop, it can be found in all positions of a word: kotir /κοτ↔ρ/ 'pigeon', krêkãr /κρΕκΘρ/ 'worker', pãk /πΘκ/ 'clean'.

/g/ is a voiced velar stop, it can occur initially, medially and finally: grê /γρΕ/ 'knot', ãgir /Θγ↔ρ/ 'fire', jarg /δΖΘργ/ 'liver'

/q/ is a voiceless uvular stop that can be found initially, medially and finally: qalaw /q℘l℘u/ 'fat', šiqãta /Σ↔θΘτ℘/ 'match', fãq /ϕΘθ/ 'snare'.

Fattah (1997:22) points out that there are two kinds of voicing in the stop consonants of Kurdish language. The first type is that the voiced stops are devoiced when followed by voiceless stops. For example the last sound in *bãb* is voiced /b/, but when we add the suffix *tãn* to it , it becomes voiceless and turns into /p/:

- /β / → /π/

bãbtãn? 'your father'

/βαβ ταν/ → / βαπταν/

Tableau: 4(assimilation of /b/→/π/)

Bãbtãn	**AGREE(voice)**	**IDENT(voice)**
a. /βΘβ τΘν/	***!**	
b. / βΘπ τΘν /☞		*

- Agree(voice)>>Ident IO, when COD/δ/ ~\ONS/ϖλσ χονσοσναντ/

The constraint Agree(voice) dominates the Ident IO constraint when the voiceless stop consonant /τ/ comes initially, and preceded by a word ending with the voiced bilabial stop consonant /b/. The Agree(voice) entails that the voice feature of coda of one segment moves to the onset of the coming word. While Ident IO entails that the input form of a segment must be identical with its output.

The rest of stops will assimilate in the following way:

/γ / → /κ/

Sãgtãn hãya? 'Do you have dog?'

/δ / → /τ/

Sad kas 'one hundred persons'

/π / → /β/

Kip boon 'being silent'

/τ / → /δ/

Nat bird? 'Have not you taken it?'

/κ / → /γ/

Pêk dãdãn? 'collision'

/τ / → /π/

çĭt *paida kird? 'What did you get?*
/τ / → /σ/
çãwt sãẋ bê! 'Thank you!'
/τ / → /ζ/
Bãznakat zeřa? 'Is your bracelet gold?'
/τ / → /ν/
Kasit nãrd ba dwai? 'Did you send anyone after him?'
/τ / → /λ/
Gwêt lêma? 'Do you hear me?'
/δ/ → /σ/
Čand sãĺi? 'How old are you?'
/δ/ → /λ/
Ãzãd lãwa. 'Azad is young.'
/δ/ → / ʃ /
Čãnd jwãna. 'How beautiful it is!'
/κ/ → /γ/
Lêk gaeštin. 'Understanding one another'
/κ/ → /θ/
Yak qãp. 'one plate
/κ/ → /ξ/
Rêk-xrãw 'organized'

The example in tableau 4 plus other instances, show the instances of the assimilation related to stop sounds in Kurdish language. There is an interaction between two constraints; Agree(x) and IdnetIO. The former constraint asks for the agreement of sound features such as place, voice and manner between the neighbouring sounds within word boundaries. While the latter constraint demands the intactness of an input form with its output form. Candidate 'a' which is a representation of the items preserving their feature without undergoing any change, is in competition with candidate 'b' which is a representation of the candidates undergoing changes in sound features. The loser candidate which fails to satisfy the high ranked constraint is candidate 'a' since it incurs a fatal violation of the high ranked constraint. In this case, candidate 'b' wins the competition by satisfying the high ranked constraint, though it incurs a minor violation of the low ranked constraint. Candidate 'b' is the optimal candidate marked by the index symbol ☞.

Local Assimilation of Fricatives:

There are eleven fricative consonants in Kurdish language; they are:

/f/ is a voiceless labio dental fricative, it can be found in all positions of a word: firoka 'plane', bafir 'snow', kaf 'foam'

/v/ is a voiced labio dental fricative, found rarely in CK, it can be found in initial, middle and final position: Vĭn 'love', Tãvga 'waterfall', mirov 'human'.

/s/ is a voiceless alveo-dental fricative, it can be found in all positions of a word: sãda 'simple', pãsãw 'pretext', kirãs 'shirt'.

/ζ/ is a voiced Alveo-dental fricative, it can be initially, medially and finally: zeerak 'clever', bãzin 'hand ring', pyãz 'onion'.

/Σ/ is a voiceless Alveo-palatal fricative: it can be found in all positions of a word: šer 'lion', pišila 'cat', řaš 'black'

/Z/ is a voiced Alveo-palatal fricative: it can be found in all positions of a word: žin 'woman', řêža 'rate', lêž 'slope'.

/x/ is a voiceless post-velar fricative, it can be found initially, medially, and finally: xwê 'salt', saxt 'difficult', šãx 'mountain'.

/ẋ/ is a voiced post-velar fricative, it can be found initially, medially, and finally: ẋãrdãn 'running', daẋĺ 'grass', bãẋ 'garden'.

/ĥ/ is a voiceless pharyngeal fricative, it can be found initially, medially, and finally: ĥaft 'seven', maĥãĺ 'impossible', gwnãĥ 'sin'.

/?/ is a voiced pharyngeal fricative, it can be found only in initial and middle positions of some load words: ?aeb 'shame', sa?ãt 'watch'.

/h/ is a voiceless glottal fricative: it can be found only in initial and middle positions of words: hãwrê 'friend', bahãr 'spring' (Fattah,1997:24)

According to Fattah, all voiced fricatives are devoiced in case when they come before voiceless consonants (Ibid).
For instance, the word-final fricative /z/ will totally assimilate to the word-initial fricative /s/, as in:

- /ζ/ → /σ/

mêz sirenawa 'table-cleaning'
/μEζ σ↔ρι:ν ℘ ω ℘/ → / μEσ σ↔ρι:ν ℘ ω ℘/

Tableau: 5 (assimilation of /ƶ/→/σ/)

mêz sirenawa	AGREE(voice)	IDENT(voice)
a. / μEζ σ↔ρι:ν ℘ ω ℘/	*!	
b. / μEζ σ↔ρι:ν ℘ ω ℘/ ☞		*

- Agree(voice)>>Ident IO, when COD/ζ/ ~\ONS/σ/

The constraint Agree(voice) dominates the Ident IO constraint when the voiced fricative /ζ/ comes finally , and followed by a word beginning with the voiceless fricative consonant /σ/. The Agree(voice) entails that the place feature of coda of one segment moves to the onset of the coming word. While Ident IO entails that the input form of a segment must be identical with its output.

Here are the other instances of assimilation of fricatives:

- /ϖ/ → /ϕ/

Mirov-firoš 'human-seller'

- /Z/ → /Σ/

sãřêž-kirdin 'wound treatment'

- /ẋ/ → /x/

Qarãẋ xãnw 'beside home'

- /f/ → /v/

Ĥaft da 'seventeen'

- /s/ → /z/

Pirs ga 'reception'

- /Σ/ → /Z/

Pêš-gir 'suffix'

- /ξ/ → /ẋ/

Šãx - dãr 'ungulate, hoofed mammal'

- /ĥ/ → /?/

gunãĥ - bãr 'sinner'
/γυνΘĥ βΘρ/ → /γυνΘ? βΘρ/

- /z/ → /dž/

zstãn 'winter'
/ζστΘν/ → /džστΘν/

The same account applied for the stops, can be applied to the fricatives as well.

Local Assimilation of Affricates:

There are two affricates in Kurdish language which are: /č/ and /ĵ/:

/č/ is a voiceless post-dental affricate that can be found in all positions of a word: čãw ‘eye’, bičuk ‘small’, mãč ‘kiss’

/ĵ/ is a voiced post-dental affricate that can be found initially, medially and finally: ĵwãn ‘beautiful’, anĵuman ‘council’, bãĵ ‘tax’

Like the fricatives, the voiceless affricate /č/ will be voiced when followed by a voiced consonant, as in the following example:

- /č/ → /ĵ/

Puč-garãy ‘absurdizm’

/πYč γ ℘ ραI/ → /πYĵ γ ℘ ραI/

Tableau:6 (assimilation of /č/→/ĵ/)

Pučgarãy	AGREE(voice)	IDENT(voice)
a. /πYč γ ℘ ραI/	*!	
b. /πYĵ γ ℘ ραI/☞		*

- Agree(voice)>>Ident IO, when COD /č/ ~ONS /+voice/

The constraint Agree(voice) dominates the Ident IO constraint when the voiceless post-dental affricate /č/ comes finally , and followed by a word beginning with a voiced consonant such as /γ/. The Agree(voice) entails that the voice feature of coda of one segment moves to the onset of the coming word. While Ident IO entails that the input form of a segment must be identical with its output.

- /ĵ/ → /č/

Bãĵ κοκιρδιναωα ‘tax-collecting’

/bΘĵ κ□ ĸ↔ρδ↔ν ℘ ω↔/ → /bΘč κ□ ĸ↔ρδ↔ν ℘ ω↔/

The same explanation given for the previous two sets of Kurdish consonants can be given here too.

Local Assimilation of Nasals:

Kurdish language possesses two nasal consonants which are:

/μ/ is a voiced bilabial nasal that can be found in all positions of a word, mãĺ ‘home’, pamo ‘cotton’, mãm ‘uncle’.

/n/ is a voiced Alveo-dental nasal that can be found initially, medially and finally in a word as in: nwê ‘new’, kanãr ‘shore’, nãn ‘bread’.

Jubrail (1997:55) notices that the word-final nasal consonant /n/ totally assimilates to word-initial /l/, /r/ and /m/, as explained in the following examples:

- /n/ → /l/

Zmãn lêdãn ‘betraying’

/ζμΘν λΕδΘν/ → / ζμΘλ λΕδΘν/

Tableau:7 (assimilation of /n/→/l/)

Zmãn lêdãn	AGREE(voice)	IDENT(voice)
a. /ζμΘν λΕδΘν/	*!	
b. /ζμΘλ λΕδΘν/☞		*

- Agree(voice)>>Ident IO, when COD /n/ ~ONS /l/

The constraint Agree(voice) dominates the Ident IO constraint when the voiced post-dental nasal /n/ comes finally , and followed by a word beginning with the voiced lateral consonant /λ/. The Agree(voice) entails that the voice feature of coda of one segment moves to the onset of the coming word. While Ident IO entails that the input form of a segment must be identical with its output.

These are other cases of local assimilation nasal consonants:

- /n/ → /r/

Min řãm ĵiyawãza ‘I have a different opinion’

/μ↔ν ρΘμ ĵφΑωΑζ ℘/ → /μ↔ρ ρΘμ ĵφΑωΑζ ℘/

- /n/ → /m/

Xãwan mãĺ ‘home-owner’

/ξΘω ℘ ν μΘλ/ → /ξΘω ℘ μ μΘλ/

- /n/ → /m/

Nãn paidakrdin ‘working’

/νΘν πΘΙδΘκ↔ρδ↔ν/ → /νΘμ πΘΙδΘκ↔ρδ↔ν/

- /n/ → /m/

Bãrãn bãren ‘raining’

/βΘρΘν βΘρΙ:ν/ → /βΘρΘμ βΘρΙ:ν/

Local Assimilation of Laterals:

There are two lateral sounds in Kurdish:

/l/ is a voiced alveo-dental lateral that can be found initially, medially and finally in a word, loka ‘cotton’, hêlka ‘egg’, pol ‘class’.

/Ĺ/ is a voiced velarized alveolar lateral, it does not occur initially, it only occurs medially and finally in a word, pêĹãw ‘shoes’, guĹ ‘flower’.

Whether the dark or the light one, the word-final /l/ will assimilate to word-initial /n/, as exemplified below:

- /l/ → /n/

Čil nãn ‘forty pieces of bread’

/č↔λ νΘν/ → /č↔ν νΘν/

Tableau:8 (assimilation of /l/→/n/)

Čil nãn	AGREE(place)	IDENT(place)
a. / č↔λ νΘν/	*!	
b. /č↔ν νΘν/☞		*

- Agree(place)>>Ident IO, when COD /l/ ~ONS /n/

The constraint Agree(place) dominates the Ident IO constraint when the voiced alveo-dental lateral /l/ comes finally , and followed by a word beginning with the voiced alveo-dental nasal /ν/. The Agree(place) entails that the place feature of coda of one segment moves to the onset of the coming word. While Ident IO entails that the input form of a segment must be identical with its output.

Local Assimilation of trills:

There are two trills in Kurdish language:

/r/ is a voiced alveolar trill, it only occurs medially and finally, it cannot be found initially in a word: mirov ‘human being’, kãr ‘work’

/ř/ is a voiced alveolar trill, that can be found in all positions in a word: řêgã ‘wat’, fřêdãn ‘throwing away’, kař ‘deaf’.

The cases of assimilation here are concerned with examples in which the trill sound completely become identical to the features of the coming sound. The word final /r/ changes into word initial lateral /n/ (Jubrail, 1997:54):

- /r/ → /l/

La kãr lãdãn ‘sack’

/λ ℘ κΘρ λΘδΘν/ → /λ ℘ κΘλ λΘδΘν/

Tableau: 39(assimilation of /r/→/l/)

Čil nãn	AGREE(place)	IDENT(place)
a. /λ ℘ κΘρ λΘδΘν/	*!	
b. /λ ℘ κΘλ λΘδΘν/☞		*

- Agree(place)>>Ident IO, when COD /r/ ~ONS /l/

The constraint Agree(place) dominates the Ident IO constraint when the voiced alveolar trill /r/ comes finally , and followed by a word beginning with the voiced alveo-dental lateral /λ/. The Agree(place) entails that the place feature of coda of one segment moves to the onset of the coming word. While Ident IO entails that the input form of a segment must be identical with its output.

This is the other of case trill assimilation in Kurdish:

- /r/ → /n/

Dur nya? ‘Isn’t it far?’

/δυ⌉ρ νφιΑ/ → /δυ⌉ν νφιΑ/

Local Assimilation of approximants:

Kurdish language possesses two approximants /w/ and /j/:

/w/ is a voiced labiovelar rounded glide, that can be found in all positions in a word: wara 'come', bãwař 'belief', čãw 'eye'.

/y/ is a voiced palatal glide, that can be found initially medially and finally (Fattah, 1997:26), yãri 'game', čyã 'mountain', řoy 'he went'.

No case is observed in which the approximant sounds undergo the assimilation process.

A general note about assimilation within OT:

In general, OT treats all the linguistic phenomena on the basis of constraint interaction, not on the basis of rules like other linguistic theories. With the advance of OT came the realization that the differences among the languages can be accounted for in terms of sets of violable constraints. A view that underlies much of the modern research on phonology within the OT framework is that languages' adherence to universal constraints is almost always never absolute, and variations among varieties can be accounted for not by positing new or different rules as was the case under the umbrella of earlier models, but rather by proposing a hierarchical system of both violable and ranked constraints. Language-specific rules, within this model, are "attained through the language-specific ranking of the crucially violable constraints, the substance of which is ideally conceived of as universal" (Roca and Johnson,1999:584-585). Optimal or winner selection depends solely on satisfaction of the top-ranked constraints whose violation results in ruling out the other candidate in question.

All the assimilation cases treated throughout the paper are analyzed on the bases of two constraints; Agree(x) and IdentIO. For each case only two candidates are taken, while for each of the cases more than two candidates can be taken, because the Gen produces a large number of candidates, all the candidates will be in competition until the optimal candidate will be chosen. The optimal one is the one which best satisfies the high-ranked constraint. Let's take the example which shows the assimilation of the alveo-dental nasal /n/ to the bilabial nasal /m/.

- /n/ → /m/

Bãrãn bãren 'raining'

/βΘρΘν βΘρI:ν/ → /βΘρΘμ βΘρI:ν/

Tableau: 33 (assimilation of /n/→/m/)

Bãrãn bãren	AGREE(place)	Agree (voice)	IDENT(place)
a. /βΘρΘν βΘρI ͡ν/	*!	*	
b. / βΘρΘμ βΘρI ͡ν /☞			*
c. /βΘρΘλ βΘρI ͡ν/	*		*!
d. /βΘρΘπ βΘρI ͡ν/		*	*

- Agree(place)>>Ident IO, when COD /n/ ~ONS /b/

The constraint Agree(place) dominates the Ident IO constraint when the voiced post-dental nasal /n/ comes finally , and followed by a word beginning with the voiced bilabial plosive /β/. The Agree(place) entails that the place feature of coda of one segment moves to the onset of the coming word. While Ident IO entails that the input form of a segment must be identical with its output.

If one looks at the tableau deeply, she/he can notice that after taking into account more than two candidates, more than two constraints will involve in the competition. Still another constraint, Agree (manner), can participate in the competition process. All the candidates fail to satisfy the high ranked constraint except candidate 'b'. So if we add more candidates, and having more constraints, still the optimal candidate will be only one candidate. That is why throughout the study only two candidates with two constraints have been taken into account for the analysis of assimilation cases. Consequently, taking only two candidates makes the analysis clearer and easier to be understood. Having a large number of candidates will not change the outcome of the competition of the constraints, it will only lead to the complication of the analysis.

Conclusions:

The following conclusions can be drawn from the study:

From the current paper about assimilation in the perspective of OT in Kurdish, the following conclusions can be drawn:

1- In all the assimilation cases the markedness constraint dominates the faithfulness constraint. As this is one of universal features of marked constructions. In all the marked constructions, markedness constraint dominates faithfulness constraint.

2- A number of assimilation cases within a word boundary can be observed in Kurdish.

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